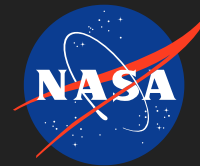


A Resonance-Enhanced Raman Sensor Using a Novel Solid State UV Laser, Phase I

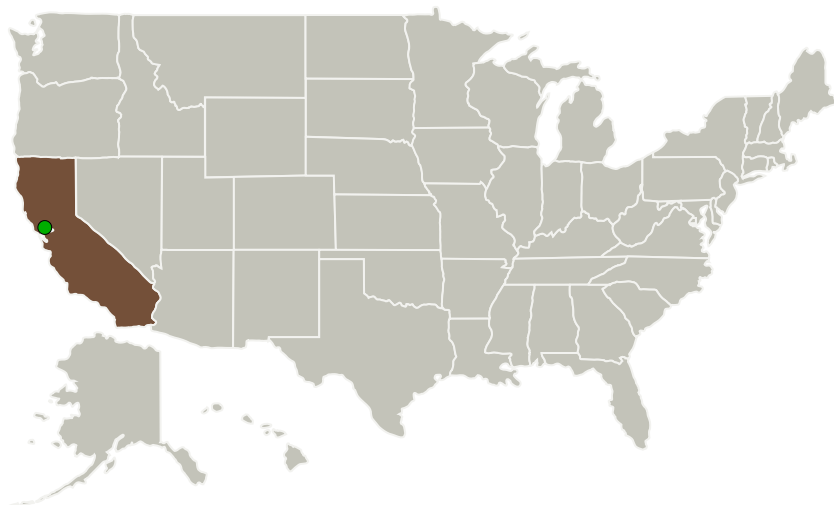
Completed Technology Project (2011 - 2011)



Project Introduction

High throughput, fast detection and characterization of organic and inorganic materials have become important challenge for future planetary robotic rover exploration and planetary missions. Crystal Research, Inc. (CRI) proposes to develop a compact resonance-enhanced Raman spectral sensor that can provide highly sensitive remote detection and in situ characterization of geological materials. Through resonance-enhanced Raman scattering by exciting samples deep in the UV region, we can enhance Raman signal intensities by a factor of 1 million or more compared with conventional Raman spectroscopy. Furthermore, the proposed instrument is operated in a spectral region that is free of fluorescence interference. Recent advances in highly efficient diode pumped true CW UV laser using a novel mixed laser crystal at CRI makes the development of such a miniaturized sensor system feasible. The proposed instrument is a miniature, low-power stand-off sensor, ideal for future NASA in situ explorations. In Phase I, we will develop all required building blocks and perform proof-of-concept demonstration. The Phase II research will be focused on the design, fabrication and characterization of a working prototype for NASA evaluations.

Primary U.S. Work Locations and Key Partners



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A Resonance-Enhanced Raman Sensor Using a Novel Solid State UV Laser, Phase I

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Organizations Performing Work	Role	Type	Location
Crystal Research, Inc.	Lead Organization	Industry	Fremont, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California

Project Transitions

▶ **February 2011:** Project Start

✓ **September 2011:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137923>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Crystal Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

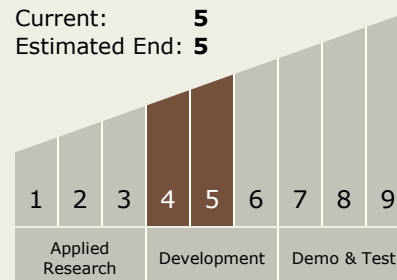
Carlos Torrez

Principal Investigator:

Suning Tang

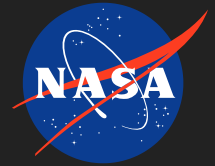
Technology Maturity (TRL)

Start: 4
Current: 5
Estimated End: 5



A Resonance-Enhanced Raman Sensor Using a Novel Solid State UV Laser, Phase I

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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.2 Atomic and Molecular Species Assessment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System